WHAT IS CLAIMED IS:

1. An image-forming apparatus comprising:

at least one image-forming section that has an exposing unit and a developing unit, said at least one image-forming section printing an image of a density detection pattern having a plurality of pattern segments of different duties, the image being printed on a print medium under a predetermined printing condition;

a density detector that outputs detection values indicative of densities of the plurality of pattern segments printed on the print medium; and

a controller that determines a correction value based on the detection values and corresponding target values to modify the printing condition.

2. The image-forming apparatus according to Claim 1, wherein said at least one image-forming section is one of a plurality of image-forming sections that print images of different colors.

3. The image-forming apparatus according to Claim 1 wherein said controller controls said image-forming section and said density detector to perform:

a first density detection operation in which said at least one image-forming section forms the image of density detection pattern with a first printing condition, and then said controller calculates a first correction value based on the density of the plurality of pattern segments detected by said density detector, said controller producing a second printing condition using the correction value; and

a second density detection operation in which the image-forming section forms the image of density detection pattern with the second printing condition, and then said controller calculates a second correction value based on the density of the plurality of pattern segments detected by said density detector, said controller

producing a second printing condition using the second correction value.

4. The image-forming apparatus according to Claim 3, wherein the plurality of pattern segments include a low duty segment, a medium duty segment, and a high duty segment;

wherein the low duty segment has a density not more than 50%, the medium duty segment has a density in the range of 30 to 80%, and the high duty segment has a density not less than 60%;

wherein densities of the low, medium, and high duty segments are related such that $D_L<D_M<D_H$ where D_L is the density in the low duty, D_M is the density in the medium duty, and D_H is the density in the high duty.

5. The image-forming apparatus according to Claim 4, wherein the first correction value indicates a correction to an amount of light emitted from the exposing unit and the second correction value indicates a correction to a developing voltage applied to the developing unit,

wherein the first correction value is calculated by Equation (1) and the second correction value is calculated by Equation (3),

$$Cl=(1/2)\{D_H\times(T_L/T_H)-D_L\}/K1+(1/2)\{D_H\times(T_M/T_H)-D_M\}/K2 \quad \cdots\cdots (1)$$

$$Cv=(1/3)(T_L-D_L)/K3+(1/3)(T_M-D_M)/K4+(1/3)(T_H-D_H)/K5 \quad \cdots\cdots (3)$$

where Cl is the first correction value,

Cv is the second correction value,

D_H is a density at a high duty not less than 60%,

D_M is a detected density at a medium duty in the range of 30 to 80%,

D_L is a density at a low duty not more than 50%,

T_H is a target density at the high duty,

T_M is a target density at the medium duty,

T_L is a detected density at the low duty,

K1 is a rate of change of D_L per unit change of the amount of light emitted from the exposing unit,

K2 is a rate of change of D_M per unit change of the amount of light

emitted from the exposing unit,
K3 is a unit change of D_L per unit change of the developing voltage,
K4 is a unit change of D_M per unit change of the developing voltage,
K5 is a unit change of D_H per unit change of the developing voltage, and
D_L, D_M, and D_H are related such that $D_L < D_M < D_H$.

6. The image-forming apparatus according to Claim 5, wherein the detected detection values are sent to a host apparatus.

7. The image-forming apparatus according to Claim 3, wherein the plurality of pattern segments include a low duty segment and a medium duty segment;

wherein the low duty segment has a density not more than 50% and the medium duty segment has a density in the range of 30 to 80%;

wherein densities of the low duty and the medium duty segments are related such that $D_L < D_M$ where D_L is the density in the low duty, and $D_M <$ is the density in the medium duty.

8. The image-forming apparatus according to Claim 7, wherein the first correction value indicates a correction to an amount of light emitted from the exposing unit and the second correction value indicates a correction to a developing voltage applied to the developing unit,

wherein the first correction value is calculated by Equation (4) and the second correction value is calculated by Equation (5),

$$Cl = (1/2)\{(T_L - D_L)/K1 + (T_M - D_M)/K2\} \cdots\cdots (4)$$

$$Cv = (1/2)\{(T_L - D_L)/K3 + (T_M - D_M)/K4\} \cdots\cdots (5)$$

where Cl is the first correction value,
Cv is the second correction value,
D_H is a density at the high duty,
D_M is a detected density at the medium duty,
D_L is a density at the low duty,
T_H is a target density at the high duty,

T_M is a target density at the medium duty,
T_L is a detected density at the low duty,
K1 is a rate of change of D_L per unit change of the amount of light emitted from the exposing unit,
K2 is a rate of change of D_M per unit change of the amount of light emitted from the exposing unit,
K3 is a unit change of D_L per unit change of the developing voltage,
K4 is a unit change of D_M per unit change of the developing voltage,
K5 is a unit change of D_H per unit change of the developing voltage, and
D_L, D_M, and D_H are related such that $D_L<D_M<D_H$.

9. The image-forming apparatus according to Claim 7, wherein the first correction value indicates a correction to an amount of light emitted from the exposing unit and the second correction value indicates a correction to a developing voltage applied to the developing unit,

wherein the first correction value being calculated by Equation (6) and the second correction value being calculated by Equation (7).

$$Cl=(1/(W1+W2)\{D_H\times(T_L/T_H)-D_L\}\times W1/K1+(1/(W1+W2)\{D_H\times(T_M/T_H)-D_M\}\times W2/K2 \quad \cdots (6)$$

$$Cv=\{(T_L-D_L)\times W3/K3+(T_M-D_M)\times W4/K4+(T_H-D_H)\times W5/K5\}/(W3+W4+W5) \quad \cdots\cdots (7)$$

where Cl is the first correction value,
Cv is the second correction value,
D_H is a density at the high duty,
D_M is a detected density at the medium duty,
D_L is a density at the low duty,
T_H is a target density at the high duty,
T_M is a target density at the medium duty,
T_L is a detected density at the low duty,
K1 is a rate of change of D_L per unit change of the amount of light emitted from the exposing unit,

K2 is a rate of change of D_M per unit change of the amount of light emitted from the exposing unit,
K3 is a unit change of D_L per unit change of the developing voltage,
K4 is a unit change of D_M per unit change of the developing voltage,
K5 is a unit change of D_H per unit change of the developing voltage,
D_L, D_M, and D_H are related such that $D_L < D_M < D_H$,
W1 is a weight used for correcting the amount of light in the low duty,
W2 is a weight used for correcting the amount of light in the medium duty,
W1 and W2 are related such that $W1 \geqq W2$, and
W3, W4, and W5 are weights used for correcting the developing voltages in the low, medium, and high duties, respectively, and W3, W4, and W5 are related such that $W3 \geqq W4 \geqq W5$.

10. The image-forming apparatus according to Claim 1, wherein said controller controls said image-forming section and said density detector to perform:

a first density detection operation in which said at least one image-forming section forms the image of density detection pattern with a printing condition, and then said controller calculates a correction value based on the density of the plurality of pattern segments detected by said density detector.

11. The image-forming apparatus according to Claim 10, wherein the plurality of pattern segments include a low duty segment, a medium duty segment, and a high duty segment;

wherein the low duty segment has a density not more than 50%, the medium duty segment has a density in the range of 30 to 80%, and the high duty segment has a density not less than 60%;

wherein densities of the low, medium, and high duty segments are related such that $D_L < D_M < D_H$ where D_L is the density in the low duty, D_M is the density in the medium duty, and D_H is the density in the high duty.

12. The image-forming apparatus according to Claim 11, wherein the first correction value indicates a correction to an amount of light emitted from the exposing unit and the second correction value indicates a correction to a developing voltage applied to the developing unit,

wherein the first correction value being calculated by Equation (1) and the second correction value being calculated by Equation (2);

$$Cl=(1/2)\{D_H\times(T_L/T_H)-D_L\}/K1+(1/2)\{D_H\times(T_M/T_H)-D_M\}/K2 \quad \cdots\cdots (1)$$

$$Cv=(1/3)\{T_L-(D_L+\Delta L\times K1)\}/K3+(1/3)\{T_M-(D_M+\Delta L\times K2)\}/K4+(1/3)\{T_H-D_H\}/K5 \quad \cdots\cdots (2)$$

where Cl is the first correction value,
Cv is the second correction value,
D_H is a density at the high duty,
D_M is a detected density at the medium duty,
D_L is a density at the low duty,
ΔL is a change of amount of light,
T_H is a target density at the high duty,
T_M is a target density at the medium duty,
T_L is a detected density at the low duty,
K1 is a rate of change of D_L per unit change of the amount of light emitted from the exposing unit,
K2 is a rate of change of D_M per unit change of the amount of light emitted from the exposing unit,
K3 is a unit change of D_L per unit change of the developing voltage,
K4 is a unit change of D_M per unit change of the developing voltage,
K5 is a unit change of D_H per unit change of the developing voltage, and
D_L, D_M, and D_H are related such that $D_L< D_M<D_H$.

13. The image-forming apparatus according to Claim 1, wherein the energy for the developing section to develop the latent image is at least one of a developing voltage applied to a developing roller,

a supply voltage applied to a toner supplying roller, and a charging voltage applied to a charging roller.

14. The image-forming apparatus according to Claim 1, wherein the energy for the latent image-forming section is an amount of light emitted from either an LED or a laser.